BIOTECHNOLOGY
CAPABILITIES

Sandia National Laboratories

FACILITIES

Biomaterials Laboratory

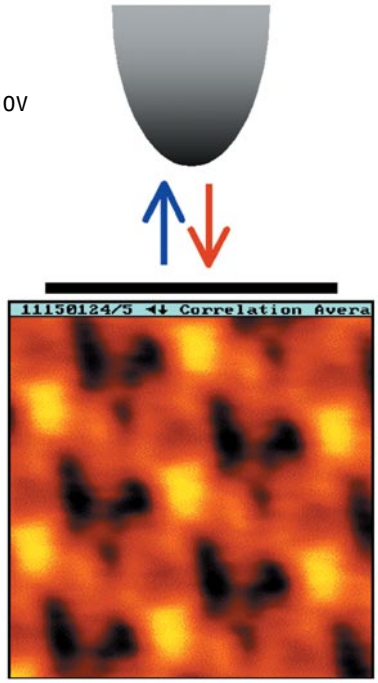
Sandia's Biomaterials Laboratory possesses equipment to perform molecular biology and biochemistry research, including genomic DNA, RNA, and plasmid isolation from many sources (e.g., bacteria, viruses, and eukaryotic tissues and cells). DNA sequences can be cloned into a variety of organisms, permitting the manipulation and modification of DNA and protein sequences, structure, and function. Cloned DNA sequences can be genetically engineered using reverse transcription, the polymerase chain reaction, and site-directed mutagenesis. Native and recombinant proteins also can be expressed, purified, characterized, and functionalized in this laboratory.

Contact: George Bachand
(505) 844-5164
email: gdbacha@sandia.gov

Scanning Probe Laboratory

Sandia has extensive facilities for the structural characterization of biomaterials. We use a variety of scanning probe techniques such as atomic force microscopy (AFM). AFM allows us to obtain high-resolution images (shown here) of proteins that reside in membranes. The technique consists of scanning a very sharp tip (radius <10 nm) with very low forces over the biomaterials surface. The low forces prevent distortion of the soft proteins and membranes. By acquiring the images in a fluid cell, we also allow the materials to assume their natural shape and to retain their functionality. We are also using AFM to study the forces between proteins and specific receptor sites that we synthesize and place in model membranes composed of lipid bilayers. This is accomplished by adhering the protein to the AFM tip and bringing it into the vicinity of the receptor site. Finally, we can use an AFM tip to unfold proteins that are immobilized on a surface or in a membrane. By unfolding the protein, we obtain valuable structural information that complements the high-resolution images.

Contact: Alan Burns
(505) 844-9642
email: aburns@sandia.gov



Using a very sharp probe (radius <10 nm) that scans over samples with very low forces, we obtain topographic images of biomaterials. In the image shown here, we reveal the crystalline array of membrane proteins.

LOCKHEED MARTIN

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy under contract DE-AC04-94AL85000.

CA.MV. 9/2002 SAND2002-3026/6P

Sandia National Laboratories